Rule WLM133: Significant transaction time was switched in sysplex

Finding: A significant amount of the transaction response time for the service class missing its performance goal was spent switched to another system in the sysplex. This finding applies to service classes that are part of a subsystem (e.g., CICS transactions).

Impact: This finding has MEDIUM IMPACT or HIGH IMPACT on performance of the service class. The level of impact depends on the percent of transaction response time spent switched to another system in the sysplex.

Logic flow: The following rules cause this rule to be invoked:

Rule WLM104: Subsystem Service Class did not achieve average response goal

Rule WLM105: Subsystem Service Class did not achieve percentile response goal

Discussion: When CPExpert produces Rule WLM104 or Rule WLM105 to indicate that a subsystem service class did not achieve its performance goal, the logic of these rules tries to identify the cause of the delay. The cause of the delay initially is analyzed from the "served" service class view. The delays from the served service class are reported by CICS (with CICS/ESA Version 4.1 and later) or by IMS (with IMSVersion 5 or later). Interaction with the Workload Manager is accomplished using the Workload Management Services macros[1].

CICS reports two separate views of the transactions: the *begin_to_end phase* and the *execution phase*[2].

- **Begin_to_end phase**. The begin_to_end phase starts when CICS has classified the transaction[3]. This action normally is done in a CICS Terminal Owning Region (TOR).

- **Execution phase**. The execution phase starts when either CICS or IMS (Version 5 or later) has started an application task to process the

[1]Please refer to Section 4 of this document for more detail about the Workload Management Services macros and how the subsystems use these macros to exchange information with the Workload Manager.

[2]IMS Version 5 reports only *execution phase* samples.

[3]Classifying the transaction into a service class is done by the Workload Manager when the subsystem manager issues the IWMCLSFY macro. Please refer to Section 4 for a more complete discussion of the subsystem work manager (e.g., CICS) interaction with the Workload Manager.

transaction. For CICS, this normally is done in a CICS Application Owning Region (AOR). For IMS, this is done in an IMS Message Processing Region (MPR).

Within each phase, CICS or IMS report the "state" of the transaction, from the view of CICS or IMS. The state of the transaction is reported in the following categories[4]:

- **Idle state**. (Both CICS and IMS report this state.
- **Ready state**. Only CICS reports this state.
- **Active state**. Both CICS and IMS report this state.
- **Wait state**. Both CICS and IMS report this state, but IMS provides only Wait for I/O state and Wait for Lock state.
- **Switched state**. Only CICS reports this state.

If the subsystem supports work manager delay reporting, the delay information is available in the "Work Manager/Resource Manger State Section" of SMF Type 72 (Subtype 3) records. When a transaction service class fails to achieve its performance goal, CPExpert analyzes the information to identify the primary and secondary causes of delay.

The Switched state indicates that processing of the transaction had been switched from the work manager (e.g., a CICS region) that was providing information to the Workload Manager. The transaction could have been switched to another CICS region (for example) in the same MVS image, switched to another MVS image in the sysplex, or switched to somewhere in the network.

- **Switched in the MVS image**. When the transaction is switched to another subsystem in the same MVS image, the subsystem from which the transaction is being shipped indicates that the monitoring environment transaction is being transferred to another subsystem (another "server). The receiving subsystem provides transaction delay information to the Workload Manager.

  CPExpert will acquire information about the server service class to which the transaction is switched. The server information will be analyzed to identify delays. If the server serves multiple transaction service classes, CPExpert prorates the delays based on amount of service provided to the

[4]Please refer to Section 4 of this document for a more comprehensive discussion of the transaction states and the interaction between the subsystem (CICS or IMS) and the Workload Manager.

different transaction service classes (the service information is contained in the R723SCS# variable in SMF TYPE 72 records). Other rules provide information about delays when a transaction has been switched in the MVS image (for example, Rule WLM120 to Rule WLM132 provide information about the transaction delays. Rules WLM150-WLM152, WLM210, WLM211, etc. provide information about the server executing in the same MVS image.)

- **Switched in the sysplex**. When the transaction is switched to or switched to another MVS image in the sysplex, the subsystem from which the transaction is being shipped indicates that the monitoring environment transaction is being transferred to another subsystem. The receiving subsystem on the new MVS image provides transaction delay information to the Workload Manager.

  CPExpert will acquire information about the server service class to which the transaction is switched. The server information will be analyzed to identify delays.

  One unfortunate aspect of the information is that there is no way to relate delays to a server with the system on which the transaction originated. For example, a CICSRGN server service class on SYSA might provide service to several transaction service classes, both those originating on SYSA and those shipped from a number of other MVS images.

  There is no way to relate the delays in CICSRGN with the transaction service classes and the MVS images on which they originate.

  CPExpert provides Rule WLM133 when a significant amount of transaction delay can be attributed to the "switched in the sysplex" state. Rule WLM133 is provided to alert you to the possibility that the server analysis is flawed.

- **Switched in the network**. If the transaction is switched somewhere in the network. the Workload Manager has no more information about the status of the transaction; it is simply "switched in the network" from the Workload Manager's view.

  CPExpert provides Rule WLM134 when a significant amount of transaction delay can be attributed to the "switched in the sysplex" state. Rule WLM134 is provided to explain why further analysis is not possible.

CPExpert produces Rule WLM133 when the primary or secondary cause of delay was that the transaction service class was in the Switched in the Sysplex state for a significant percent of its response time.

The following example illustrates the output from Rule WLM105 (to show the primary cause of delay), followed by the output from Rule WLM133:

```
RULE WLM105:  SERVICE CLASS DID NOT ACHIEVE PERCENTILE RESPONSE GOAL

   Service Class CICSPROD did not achieve its response goal during the
   measurement intervals shown below.  The response goal was 90.00 percent
   of the transactions completing within 1.000 seconds, with an importance
   level of 3.  CICSPROD was defined as a "served" Service Class (e.g.,
   IMS or CICS transactions).  The below causes of delay were based upon
   BEGIN_TO_END PHASE samples.  CICSPROD was served by CICSRGN.

                                    TRANS      %
                           TOTAL  MEETING  MEETING PERF  PRIMARY,SECONDARY
   MEASUREMENT INTERVAL    TRANS    GOAL     GOAL  INDX  CAUSES OF DELAY
   10:00-10:30,26MAR1996   6,849   5,383     78.6  4.00  SYSPLEX(87%)
   10:30-11:00,26MAR1996   6,614   4,606     69.6  4.00  SYSPLEX(86%)
   11:00-11:30,26MAR1996   6,579   4,445     67.6  4.00  SYSPLEX(85%)
   11:30-12:00,26MAR1996   6,770   5,126     75.7  4.00  SYSPLEX(86%)
   12:30-13:00,26MAR1996   6,611   5,220     79.0  4.00  SYSPLEX(86%)
   13:00-13:30,26MAR1996   6,752   4,993     73.9  4.00  SYSPLEX(86%)


RULE WLM133:  SIGNIFICANT TRANSACTION TIME WAS SWITCHED IN SYSPLEX

   A significant amount of the transaction response time for the CICSPROD
   Service Class was spent switched to another MVS image in the sysplex.
   Please refer to the description of Rule WLM133 for a discussion of
   the implications of this finding on the analysis being done by CPExpert.
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At present, there is little information provided regarding delays to transaction service classes once the transaction has been switched to another system. There exists at least the following possible delays:

- Queue delay in the system being analyzed (MRO/XCF delays or ISC delays caused by the system or by CICS parameters). These delays might be revealed by the CICS Component of CPExpert as it analyzes CICS performance constraints.

- Coupling facility delays. CPExpert will automatically analyze coupling facility statistics when Rule WLM133 is produced. This analysis may reveal problems with the coupling facility parameters.

- Delays in the system to which the transaction is being shipped. CPExpert will automatically analyze delays in all systems in which the transaction service class executes. There are several scenarios that complicate the analysis:

    - The sysplex is set up in a "standard" way in which a CICS Terminal Owning Region (TOR) is started in one system and CICSplex/SM is used switch transactions to Application Owning Regions (AORs) on a number of systems.

This is the simplest to evaluate, as there is some correlation between BTE Phase in the TOR system and Execution Phase time in the other systems. In this situation, the analysis by CPExpert is plausible.

- The sysplex is set up with TORs on more than one system, transactions can be submitted to the different TORs on different systems, and the transactions are switched among systems on the sysplex.

  It becomes unclear which system actually processes the transactions of a transaction service class missing its performance goal. (That is, the transactions might process satisfactorily on one system but not perform well on another system.)

  Further, depending on the transaction mix on different systems, there may be different delays to transactions on the different systems. It is entirely possible that performance may be acceptable on several systems, while performance is poor on one or more other systems.

  The analysis in this situation is suspect, at present. Perhaps as the CPExpert algorithms improve (or more data is available), the analysis will be more robust.

Suggestion: There are no suggestions with this finding, since it simply explains why CPExpert may not be able to provide meaningful information about the causes of delay for the service class missing its service goal on the system in which the service class delay was detected.

CPExpert will analyze the delays on each MVS image in which the transaction service class executed. Other rules will be produced to provide more information.

